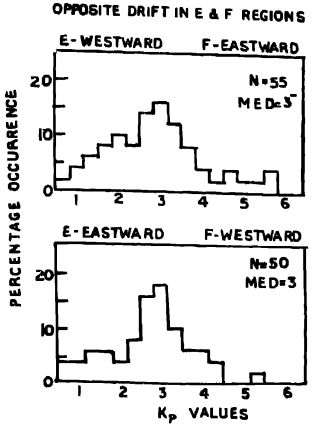

Fig. 4

equatorial ionosphere are not affected by them. The case of the opposite drift at two heights appears to be more local in origin.

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Effect of solar flares on the intensity of 5577 Å line of night air glow

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The oxygen ($^1S \rightarrow {}^1D$) green line emission λ5577Å in the night air-glow has been the subject of numerous investigations. Considerable interest is attached to its

correlation with solar flares. The enhancement of the intensity of the green line λ5577Å has been noticed in a number of cases during the 1968-1969 period of observations at Dumka (lat. 24° 16′N, long. 87° 15′E), Bihar. Some examples have been graphically represented in figures 1, 2, 3 and 4, where the relative intensities have been plotted against local night hours for the following nights :

(i) night preceding the day of occurrence of the solar flare;

(ii) night following the diurnal flare;

(iii) next succeeding night.

The increase in the intensity following the occurrence of flare is quite apparent in figures 1, 2 and 3. However, the effect of the flare appears to depend on the location of the flare, its latitude and longitude on the solar disc. Thus, the solar flare occurring on 19th October 1968 does not increase the relative intensity of the green line as evident from figure 4.

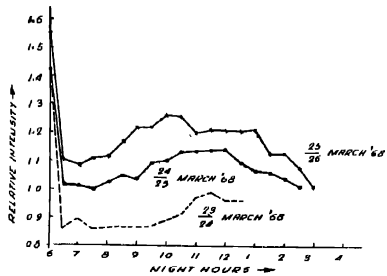

Figure 1

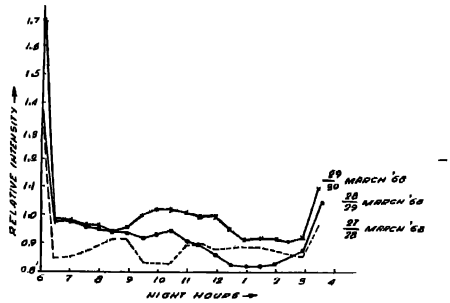

Figure 2

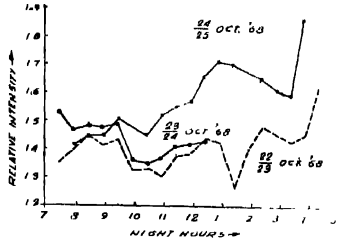

Figure 3

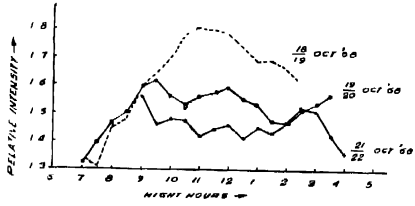

Figure 4

Table 1 exhibits the date, time, duration and importance of some typical solar

The dates of solar flares as observed at Kodai Kanal (India) from January 1968 to May 1969 have been considered for the study of this effect Since λ5577Å emission line exhibits a strong diurnal variation, the mean intensities for the corresponding nights have been taken into account for calculating the percentage variations. Out of 13 flares studied so far, only two (occurring on 24th Feb. 1968 and 19th Oct. 1968 respectively) did not cause any increase in the relative intensity of the green line, although the flares were quite prominent and of long duration. The location of the flares at relatively higher longitudes may have been responsible for such an anomaly. Most of the remaining flares, whose latitudes and longitudes on the solar disc were low, caused an increase in the relative intensity of the 5577Å emission line during the same night or during the following second and third nights. As a matter of fact, three flares caused an increase in the relative intensity during the same night and a decrease during following nights, while the remaining ones exhibit an increase on the second and third nights after the flare. The average increase in the relative intensity during nights following the flares has been found to be from 1.8% to 16% depending on the strength or the number of flares on the same day

Table 1

No.	Date of Solar Flare	G.M.T.	Duration	Importance	Co-ordinates	Remarks
1	24th Feb.' 68	0708	55 mins.		16°N, 90°E	No increase detected.
2	24th March '68	0749	13 mins.		13°S, .05°E	Intensity increases in the N, Z and S directions on the same and following nights.
3	28th March '68	0331	28 mins		14°S, 48°W	Intensity increases in the N. Z & S directions on the same & following nights.
4	22nd Oct. '68	0729	21 mins.		17°N, 19°E	Lower intensity during the same night but increases on succeeding two days.
5	19th Oct. '68		1 hr 33 mins.		17°N, 59°E	Intensity decreases during same and 3rd nights No readings could be taken during 2nd night due to clouds.

Notes : (a) Local time in advance of G.M.T. by about 5.82 hrs

(b) Relative intensity evaluation : Importance : faint (f), normal (n), brilliant (b)

(c) I_N—Relative intensity of 5577Å light coming from the direction of the N-Pole,

I_Z— .. ..from the Zenith

I_S— . . .. in the geographical meridian at an altitude equivalent to that of the Pole Star.

Dandekar & Silverman (1964) have shown that out of 132 observations corresponding to solar flares, only 85 showed an increase The delay in the increase of relative intensity have been ascribed by them as being due to the time taken by the stream of particles in traversing a distance of about 93 million miles from the Sun to the Earth. If the increase be ascribed to particle flux emitted during a solar flare, then the flares occurring at high longitudes (*e.g.* 90° on 24th Feb. 1968), may not project any particle beam on the earth's upper atmosphere. The same argument may perhaps be applicable to the solar flare on 19th Oct. 1968. However, electromagnetic radiation like UV and X-rays emitted during a solar flare may obviously cause a quicker increase in the relative intensity during the same night. Evidently, the effect of solar flares on the relative intensity of 5577Å emission line seems to be partly due to electromagnetic radiations and partly due to the particle flux emanated during a solar flare.

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